

IN THE SPECIFICATION:

On page 3, please replace the second full paragraph with the following amended paragraph:

In one aspect, the present invention provides a non-aqueous electrolyte battery comprising a battery device including an anode having an anode mixture containing an anode active material, and a cathode having a cathode mixture containing a cathode active material, the anode and the cathode being layered together via a separator, a solid electrolyte including ~~an organic high molecular polymer~~ material and an electrolyte salt contained therein, and a film-shaped exterior material housing therein the battery device and the solid electrolyte, wherein a gas adsorbing carbon material formed of a carbonaceous material having a specific surface not less than 30 m²/g is added to the anode mixture and/or to the cathode mixture for adsorbing a gas evolved within the battery.

On page 3, please replace the fourth paragraph with the following amended paragraph:

In another aspect, the present invention provides a non-aqueous electrolyte battery comprising a battery device including an anode having an anode mixture layer containing an anode active material on an anode current collector, the anode having an exposed anode current collector portion exposing the anode current collector, and a cathode including a cathode mixture layer containing a cathode active material on a cathode current collector, the cathode having an exposed cathode current collector portion exposing the cathode current collector, the anode and the cathode being layered together via a separator, a solid electrolyte including ~~an organic high molecular polymer~~ material and an electrolyte salt contained therein, a gas adsorbing carbon layer containing a gas adsorbing carbon material with specific surface not less than 30 m²/g, for adsorbing a gas evolved within the battery, and a film-shaped exterior material housing therein the battery device, the solid electrolyte and the gas adsorbing carbon layer. The gas adsorbing

carbon layer is provided to the exposed anode current collector portion and/or to the exposed cathode current collector portion.

On page 4, please replace the second full paragraph with the following amended paragraph:

In yet another aspect, the present invention provides a non-aqueous electrolyte battery comprising a battery device including an anode having an anode mixture containing an anode active material, and a cathode having a cathode mixture containing a cathode active material, the anode and the cathode being layered together via a separator, a solid electrolyte including an ~~organic high molecular polymer~~ material and an electrolyte salt contained therein, a gas adsorbing carbon layer composed of a carbonaceous material with a specific surface not less than 30 m²/g for adsorbing a gas evolved in the battery, and a film-shaped exterior material housing therein the battery device, the non-aqueous electrolyte and the gas adsorbing carbon layer. The gas adsorbing carbon layer is provided to an inner surface of the film-shaped exterior material facing the battery device.

On page 8, please replace the second full paragraph with the following amended paragraph:

The material capable of doping/undoping lithium ions may be exemplified by, for example, non-graphitizable carbon, graphitizable carbon, graphite, pyrocarbons, cokes, vitreous carbons, sintered ~~organic high molecular polymer~~ compounds, carbon fibers or activated charcoal. Examples of the cokes include pitch coke, needle coke and petroleum coke. The sintered ~~organic high molecular polymer~~ compounds mean high molecular compounds, such as phenol resin or furan resin, carbonized on firing at an appropriate temperature. There are those sintered ~~organic high molecular polymer~~ compounds which may be classified into non-graphitizable carbon and graphitizable carbon.

On page 10, please replace the first full paragraph with the following amended paragraph:

To the anode mixture layer 9 is added a gas adsorbing carbon material, capable of adsorbing a gas evolved in the battery. The gas adsorbing carbon material is, for example, a carbonaceous material having a specific surface not less than $30\text{ m}^2/\text{g}$ as measured by the BET method, and may be exemplified by carbon black, such as acetylene black or ~~Ketjen black~~ Ketjen Black, and activated carbon, having a specific surface generally on the order of 700 to $1600\text{ m}^2/\text{g}$. These materials may be used either singly or in combination.

On page 17, please replace the second full paragraph with the following amended paragraph:

The solid electrolyte 6 serves for transferring e.g. lithium ions between the anode 4 and the cathode 5. Thus, an organic solid electrolyte having lithium ion conductivity is used as the solid electrolyte 6. As this organic solid electrolyte, a high polymer solid electrolyte, composed of an electrolyte salt and ~~an organic high molecular polymer~~ material containing the electrolyte salt, or a gel electrolyte, composed of a non-aqueous electrolytic solution contained in a high molecular matrix, may be used. The solid electrolyte 6 is formed as an electrolyte layer by coating the electrolytic solution containing the organic solid electrolyte on the surfaces of the anode 4 and the cathode 5 and solidifying the resulting product.

On page 21, please replace the second full paragraph with the following amended paragraph:

A solid electrolyte 6 then is formed, as a layer, on each of the major surface of the anode mixture layer 9 of the anode 4 and the major surface of the cathode mixture layer 13 of the cathode 5. In forming the solid electrolyte 6, the electrolyte salt is dissolved in a non-aqueous solvent to prepare a non-aqueous electrolyte solution. This non-aqueous electrolyte solution, ~~an organic high molecular polymer~~ material or a matrix molecular material and, if necessary, a non-aqueous solvent as a diluted solvent, are mixed and agitated together to prepare an electrolytic solution in a sol form. This electrolytic solution is applied to the major surface of the anode mixture layer 9 of the anode 4 and to the major surface of the cathode mixture layer 13 of the

cathode 5. The solvent for dilution then is vaporized off to form the solid electrolyte 6 composed of the high molecular solid electrolyte or the gel electrolyte. This forms the solid electrolyte 6 as electrolyte layers on both the cathode 5 and the anode 4.

On page 30, please replace the first full paragraph with the following amended paragraph:

A cathode was then prepared. In producing the cathode, 95 parts by weight of powdered LiCoO₂, as a cathode active material, 2 parts by weight of ~~ketchen black~~ Ketjen Black, manufactured by LION CORPORATION, as an electrically conductive material, 3 parts by weight of PVdF as a binder, and NMP as a solvent, were mixed and kneaded together by a planetary mixer, for dispersion, in order to prepare a coating solution of the cathode mixture. Using a die coater as a coating apparatus, the coating solution of the cathode mixture was coated uniformly on each surface of a strip-shaped aluminum foil, 20 μ m thick, as a cathode current collector. The resulting product was dried in situ for 24 hours at 100°C under reduced pressure and molded under compression in a roll press to form a layer of the cathode mixture, which then was cut to a predetermined size. A cathode lead terminal of aluminum then was connected to the exposed cathode collector portions by ultrasonic welding. This completes an elongated cathode.

On page 33, please replace the second full paragraph, with the following amended paragraph:

In the sample 4, an anode was prepared in the same way as in the sample 1, except that ~~ketchen black~~ Ketjen Black, with the specific surface as measured by the BET method equal to 800 m²/g, manufactured by LION CORPORATION, was used as a gas adsorbing carbon material. A polymer battery was prepared in the same way as the sample 1, except that this anode was used in this sample 4.

On page 38, please replace Table 1, with the following amended table:

Table 1

gas absorbing mixture layer type	gas absorbing carbon material added to anode	specific surface (m ² /g)	amount of addition (wt%)	charging/ discharging efficiency (%)	high temperature storage (%)	swell due to high temperature (°C)	battery temperature in over-charging (°C)
sample 1 acetylene black	30	0.5	78	180		90	
sample 2 acetylene black	70	0.5	77	166	89		
sample 3 acetylene black	130	0.5	78	141	90		
sample 4 ketene black	800	0.5	77	120	88		
Ketjen Black							
sample 5 activated carbon	800	0.5	77	120	90		
sample 6 acetylene black	130	0.1	79	180	90		
sample 7 acetylene black	130	0.3	78	127	89		
sample 8 acetylene black	130	1	77	118	91		

sample 9	acetylene black	130	3	77	116	89
sample 10	acetylene black	130	5	76	114	89
sample 11	acetylene black	130	6	74	112	88
sample 12	-	-	-	78	316	70
sample 13	acetylene black	15	0.5	78	190	88
sample 14	acetylene black	130	0.05	78	230	89
sample 15	acetylene black	130	9	68	110	89

On page 43, please replace fourth full paragraph and continuing with second and third full paragraphs on page 44 with amended paragraphs:

In the sample 16, a cathode in which the gas adsorbing carbon material had been added at 0.2 wt% of the total weight of the entire cathode mixture layer was prepared in the same way as in sample 1, except preparing a coating solution of the cathode mixture by mixing 96.8 parts by weight of LiCoO₂, 0.2 part by weight of ~~ketchen black~~ Ketjen Black with the specific surface of 800 m²/g as measured by the BET method, manufactured by LION CORPORATION, as a gas adsorbing carbon material/ electrically conductive material, 3 parts by weight of PVdF as a binder, and NMP as a solvent, subjecting the resulting mixture to dispersion and employing the so produced coating solution. A polymer battery, in which the gas adsorbing carbon material had been added only to the cathode mixture layer, was prepared in the same way as the sample 12 except that this cathode was employed in this sample 16.

In the sample 17, a cathode was prepared in the same way as in the sample 16, except that ~~ketchen black~~ Ketjen Black was added as a gas adsorbing carbon material at 0.5 wt% of the total weight of the entire cathode mixture layer. A polymer battery was prepared in the same way as in the sample 16, except that this cathode was employed in this sample 17.

In the sample 18, a cathode was prepared in the same way as in the sample 16, except that ~~ketchen black~~ Ketjen Black was added as a gas adsorbing carbon material at 1 wt% of the total weight of the entire cathode mixture layer. A polymer battery was prepared in the same way as in the sample 16, except that this cathode was employed in this sample 18.

On page 45, please replace paragraph one, with the following amended paragraph:

In the sample 19, a cathode was prepared in the same way as in the sample 16, except that ~~ketchen blaek~~ Ketjen Black was added as a gas adsorbing carbon material at 3.5 wt% of the total weight of the entire cathode mixture layer. A polymer battery was prepared in the same way as in the sample 16, except that this cathode was employed in this sample 19.

On page 45, please replace paragraphs three and four with the following amended paragraphs:

In the sample 21, a cathode was prepared in the same way as in the sample 16, except that ~~ketchen blaek~~ Ketjen Black was added as a gas adsorbing carbon material at 0.1 wt% of the total weight of the entire cathode mixture layer. A polymer battery was prepared in the same way as in the sample 16 except that this cathode was used in this sample 21.

In the sample 22, a cathode was prepared in the same way as in the sample 16, except that ~~ketchen blaek~~ Ketjen Black was added as a gas adsorbing carbon material at 4 wt% of the total weight of the entire cathode mixture layer. A polymer battery was prepared in the same way as in the sample 16, except that this cathode was employed in this sample 22.

On page 47, please replace the Table 2, with the following amended Table.

Table 2

	gas absorbing carbon material added to cathode mixture layer	specific surface (m ² /g)	amount of addition (wt%)	charging/ discharging efficiency (%)	due to storage at elevated temperatures (%)	amount of swell due to over-charging	battery temperature in over-charging (°C)
sample 16	<u>ketehem blaek</u> <u>Ketjen Black</u>	800	0.2	78	182	80	
sample 17	<u>ketehem blaek</u> <u>Ketjen Black</u>	800	0.5	77	167	84	
sample 18	<u>ketehem blaek</u> <u>Ketjen Black</u>	800	1	78	152	87	
sample 19	<u>ketehem blaek</u> <u>Ketjen Black</u>	800	3.5	77	141	90	
sample 20	-	-	-	40	450	70	
sample 21	<u>ketehem blaek</u> <u>Ketjen Black</u>	800	0.1	77	195	77	
sample 22	<u>ketehem blaek</u> <u>Ketjen Black</u>	800	4	-	80	150	≥200

On page 49, please replace the second, third and fourth paragraphs with the following amended paragraphs:

From the results of evaluation shown in Table 2, the charging/discharging capacity is appreciably larger and the amount of swell on storage under elevated temperatures is appreciably smaller in the samples 16 to 19 where ~~ketchen black~~ Ketjen Black is added in an amount not less than 0.2 wt% and not larger than 3.5 wt% than in the sample 20 where no ~~ketchen black~~ Ketjen Black as an electrically conductive material/ gas adsorbing carbon material is added.

In the sample 20, in which ~~ketchen black~~ Ketjen Black as an electrically conductive material/ gas adsorbing carbon material is not added to the cathode mixture layer, the cathode mixture layer is deteriorated in electrical conductivity, thus lowering the battery characteristics. Moreover, in the sample 20, in which no gas adsorbing carbon material is added to the cathode mixture layer, a gas is evolved due to heating and stored in the battery, thus increasing the battery thickness to a large extent.

From the results of evaluation shown in Table 2, the amount of swell caused by storage under elevated temperatures is smaller in the samples 16 to 19 than in the sample 21 where 0.1 wt% of ~~ketchen black~~ Ketjen Black is added to the cathode mixture layer.

On page 50, please replace paragraphs one, two, three and four with the following amended paragraphs:

In the sample 21, where the amount of addition of ~~ketchen black~~ Ketjen Black as an electrically conductive material/ gas adsorbing carbon material is 0.1 wt% of the total weight of the cathode mixture layer, such that the amount of ~~ketchen black~~ Ketjen Black added to the cathode mixture layer is small, the amount of the gas evolved on heating in the battery which is adsorbed to ~~ketchen black~~ Ketjen Black is also small. Thus, in the sample 21, the amount of the gas stored in the battery is large to increase the battery thickness.

From the results of evaluation shown in Table 2, it is also seen that the battery temperature at the time of over-charging is lowered appreciably in the samples 16 to 19 as compared to that of the sample 22 in which 4 wt% of ~~ketchen black~~ Ketjen Black is added to the cathode mixture layer.

In the sample 22, in which the amount of addition of ~~ketchen black~~ Ketjen Black as an electrically conductive material/ gas adsorbing carbon material is 4 wt% of the total weight of the cathode mixture layer, such that the amount of highly electrically conductive ~~ketchen black~~ Ketjen Black added to the cathode mixture layer is excessively large, the electrical conductivity of the cathode mixture layer is increased excessively due to the excess amount of ~~ketchen black~~ Ketjen Black. The result is that the battery temperature is raised in case the battery is in the excessively charged state to render it difficult to maintain the battery safety.

In these samples 16 to 19, in contradistinction from the samples 20 to 22, the amount of addition of ~~ketchen black~~ Ketjen Black as an electrically conductive material/ gas adsorbing carbon material is moderate, being not less than 0.2 wt% and not larger than 3.5 wt%, so that it is possible to prevent the gas from being accumulated in the battery to achieve excellent battery characteristics and safety.

On page 51, please replace first full paragraph with the following amended paragraph:

It is seen from above that addition of ~~ketchen black~~ Ketjen Black as an electrically conductive material/ gas adsorbing carbon material in an amount not less than 0.2 wt% and not larger than 3.5 wt% of the total weight of the cathode mixture layer is highly effective in manufacturing a polymer battery in which the amount of swell due to storage at elevated temperatures is suppressed and the battery safety in over-charging is raised.

On page 51, please replace paragraph three with the following amended paragraph:

In the sample 23, a cathode in which a gas adsorbing carbon material was added at 0.2 wt% of the total weight of the entire cathode mixture layer was prepared in the same

way as in sample 1, except employing a coating solution of the cathode mixture prepared by mixing and dispersing 94.8 parts by weight of LiCoO₂, 2 wt% of ~~ketehen black~~ Ketjen Black as an electrically conductive material, 0.2 part by weight of activated carbon with the specific surface of 800 m²/g as measured by the BET method, manufactured by KANTO KAGAKU KK, as a gas adsorbing carbon material, 3 parts by weight of PVdF, as a binder, and NMP as a solvent. A polymer battery, in which the gas adsorbing carbon material is deposited only to the cathode mixture layer, was prepared in the same way as in the sample 12, except that this cathode was used in this sample 23.

On page 58, please replace third full paragraph with the following amended paragraph:

In the sample 31, an anode was prepared in the same way as in the sample 30, described above, except forming the gas adsorbing carbon layer on the exposed anode current collector portion, using ~~ketehen black~~ Ketjen Black with the specific surface as measured by the BET method of 800 m²/g, as the gas adsorbing carbon material, manufactured by LION CORPORATION. A polymer battery, having the gas adsorbing carbon layer on the anode, was prepared in the same way as in the sample 1, except that this anode was used in this sample 31.

On page 60, please replace second full paragraph with the following amended paragraph:

In the sample 35, a cathode was prepared in the same way as in the sample 34, described above, except forming the gas adsorbing carbon layer on the exposed cathode current collector portion, using ~~ketehen black~~ Ketjen Black with the specific surface as measured by the BET method of 800 m²/g, manufactured by LION CORPORATION, as the gas adsorbing carbon material. A polymer battery, having the gas adsorbing carbon layer on the cathode, was prepared in the same way as in the sample 12, except that this anode was used in this sample 35.

On pages 63 and 64, please replace Table 4 with the following Table:

Table 4

	gas absorbing carbon layer	charging/ discharging efficiency (%)	swell high (%)	on storage at temperature	battery temperature in over-charging (°C)
sort of gas absorbing carbon layer	mounting position				
sample 30 acetylene black	exposed anode collector part	78	110		91
sample 31 <u>ketjen black</u> <u>Ketjen Black</u>	exposed anode collector part	79	101		91
sample 32 activated carbon	exposed anode collector part	77	101		89
sample 33 carbon tape	exposed anode collector part	77	176		90
sample 34 acetylene black	exposed cathode collector part	78	110		89
sample 35 <u>ketjen black</u> <u>Ketjen Black</u>	exposed cathode collector part	78	101		90
sample 36 activated carbon	exposed cathode collector part	78	101		88
sample 37 carbon tape	exposed cathode collector part	78	177		89
sample 38 activated carbon	exposed anode collector part	78	100		90
	exposed cathode collector part				
sample 39 carbon tape	inner surface of exterior material	78	185		88
sample 12 -	-	78	316		70